

Claims

1. A method of controlling a multi-mode multi-band mobile communication terminal for handover, the multi-mode multi-band mobile communication terminal being provided with an asynchronous modem unit and a synchronous modem unit and being capable of receiving signals from a synchronous mobile communication system during use of service provided by an asynchronous mobile communication system in a mobile communication network in which the asynchronous and synchronous mobile communication systems coexist, the method comprising:

the first step of, as the mobile communication terminal using the service provided by the asynchronous mobile communication system moves into a synchronous area, the asynchronous modem unit of the mobile communication terminal receiving a dummy pilot signal from the synchronous mobile communication system, driving the synchronous modem unit of the mobile communication terminal, searching for a cell in which to perform handover, notifying the asynchronous mobile communication system of results of a search for a cell in which to perform handover, and transmitting a channel assignment message to the synchronous modem unit when a handover command has been received from the asynchronous mobile communication system;

the second step of switching a vocoder and turning off the asynchronous modem unit; and  
the third step of the synchronous modem unit achieving synchronization with the synchronous mobile communication system.

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2. A method of controlling a multi-mode multi-band mobile communication terminal for handover, the multi-mode multi-band mobile communication terminal being provided with an asynchronous modem unit and a synchronous modem unit and being capable of transmitting and receiving signals to and from a synchronous mobile communication system during use of service provided by an asynchronous mobile communication system in a mobile communication network in

which the asynchronous and synchronous mobile communication systems coexist, the multi-mode multi-band mobile communication terminal being capable of transmitting and receiving signals to and from the synchronous mobile communication system during use of service provided by the asynchronous mobile communication system, the method comprising:

5 the first step of, as the mobile communication terminal using the service provided by the asynchronous mobile communication system moves into a synchronous area, the asynchronous modem unit of the mobile communication terminal receiving a dummy pilot signal from the synchronous mobile communication system, driving the synchronous modem unit of the mobile communication terminal, searching for a cell in which to perform handover, notifying the asynchronous mobile communication system of results of a search for a cell in which to perform handover, and transmitting a channel assignment message to the synchronous modem unit when a handover command has been received from the asynchronous mobile communication system;

10 the second step of the synchronous modem unit achieving synchronization with the synchronous mobile communication system; and

15 the third step of switching a vocoder and turning off the asynchronous modem unit.

3. The mobile communication terminal control method according to claim 1 or 2, wherein the dummy pilot signal has the same frequency as that used in the asynchronous mobile communication system.

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4. The mobile communication terminal control method according to claim 1 or 2, wherein the first step comprises the steps of:

the asynchronous modem unit receiving the dummy pilot signal from a base station of the synchronous mobile communication system;

the asynchronous modem unit requesting the synchronous modem unit to drive a synchronous modem;

the synchronous modem unit performing an initialization procedure for the synchronous modem, and searching for a pilot channel of the synchronous mobile communication system;

5 the synchronous modem unit notifying the asynchronous modem unit of results of a search for a pilot channel, which are the search results for the cell of the synchronous mobile communication system;

the asynchronous modem unit transmitting the search results for the cell of the synchronous mobile communication system to the asynchronous mobile communication system;

10 the synchronous modem unit searching for a synchronous channel of the synchronous mobile communication system and changing to an idle state; and

the asynchronous modem unit transmitting the channel assignment message to the synchronous modem unit as the asynchronous mobile communication system commands the asynchronous modem unit to perform handover.

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5. The mobile communication terminal control method according to claim 1 or 2, wherein the achieving of the synchronization with the synchronous mobile communication system comprises the steps of:

the synchronous modem unit changing to a traffic state;

20 the synchronous modem unit transmitting reverse traffic signal to the base station of the synchronous mobile communication system; and

the synchronous modem unit notifying the synchronous mobile communication system that handover has been completed.

6. A method of controlling a multi-mode multi-band mobile communication terminal for handover, the multi-mode multi-band mobile communication terminal being provided with an asynchronous modem unit and a synchronous modem unit and being capable of receiving signals from a synchronous mobile communication system during use of service provided by an asynchronous 5 mobile communication system in a mobile communication network, in which the asynchronous and synchronous mobile communication systems coexist and a handover cell having a preset size is placed at a boundary region between asynchronous and synchronous mobile communication system areas, the method comprising:

the first step of, as the mobile communication terminal using the service provided by the 10 asynchronous mobile communication system moves into the synchronous area through the handover cell area, the asynchronous modem unit of the mobile communication terminal obtaining system information transmitted from a handover base station in the handover cell area, driving the synchronous modem unit of the mobile communication terminal, and requesting the asynchronous mobile communication system to perform handover;

15 the second step of the mobile communication terminal driving the synchronous modem unit and changing to an idle state;

the third step of the asynchronous modem unit of the mobile communication terminal transmitting a channel assignment message to the synchronous modem unit when a handover command has been received from the asynchronous mobile communication system;

20 the fourth step of the mobile communication terminal turning off the asynchronous modem unit and switching a vocoder; and

the fifth step of the synchronous modem unit achieving synchronization with the synchronous mobile communication system.

7. A method of controlling a multi-mode multi-band mobile communication terminal for handover, the multi-mode multi-band mobile communication terminal being provided with an asynchronous modem unit and a synchronous modem unit and being capable of receiving signals from a synchronous mobile communication system during use of service provided by an asynchronous mobile communication system in a mobile communication network, in which the asynchronous and synchronous mobile communication systems coexist and a handover cell having a preset size is placed at a boundary region between asynchronous and synchronous mobile communication system areas, the multi-mode multi-band mobile communication terminal being capable of transmitting and receiving signals to and from the synchronous mobile communication system during use of service provided by the asynchronous mobile communication system, the method comprising:

the first step of, as the mobile communication terminal using the service provided by the asynchronous mobile communication system moves into the synchronous area through the handover cell area, the asynchronous modem unit of the mobile communication terminal obtaining system information transmitted from a handover base station in the handover cell area, driving the synchronous modem unit of the mobile communication terminal, and requesting the asynchronous mobile communication system to perform handover;

the second step of the mobile communication terminal driving the synchronous modem unit and changing to an idle state;

the third step of the asynchronous modem unit of the mobile communication terminal transmitting a channel assignment message to the synchronous modem unit when a handover command has been received from the asynchronous mobile communication system;

the fourth step of the synchronous modem unit achieving synchronization with the synchronous mobile communication system; and

the fifth step of the mobile communication terminal turning off the asynchronous modem unit and switching a vocoder.

8. The mobile communication terminal control method according to claim 6 or 7, wherein the system information obtained by the mobile communication terminal from the handover base station has the same frequency as that used in the asynchronous mobile communication system.

5 9. The mobile communication terminal control method according to claim 8, wherein a signal including the system information transmitted from the handover base station includes scramble codes indicating information about a cell in which the mobile communication terminal is located.

10 10. The mobile communication terminal control method according to claim 6 or 7, wherein the second step comprises the steps of:

the synchronous modem unit performing an initialization procedure for the synchronous modem and preparing to search for a pilot channel of the synchronous mobile communication system;

the synchronous modem unit searching for the pilot channel and a synchronous channel of the synchronous mobile communication system; and

15 the synchronous modem unit changing to an idle state.

11. The mobile communication terminal control method according to claim 6 or 7, wherein the achieving of the synchronization with the synchronous mobile communication system comprises the steps of:

20 the synchronous modem unit changing to a traffic state;

the synchronous modem unit transmitting reverse traffic signal to the base station of the synchronous mobile communication system; and

the synchronous modem unit notifying the synchronous mobile communication system that handover has been completed.

12. The mobile communication terminal control method according to claim 6 or 7, wherein the handover cell has a size of  $S_{HOCELL} = V_{MS} * T_{HO}$ , where  $S_{HOCELL}$  is the size of the handover cell,  $V_{MS}$  is a moving speed of the mobile communication terminal, and  $T_{HO}$  is a time required for the handover.

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13. A mobile communication system, comprising:

a synchronous mobile communication network;

an asynchronous mobile communication network overlapping with the synchronous mobile communication network; and

10 a handover cell placed at a boundary between a synchronous mobile communication system and an asynchronous mobile communication system and provided with a handover base station for transmitting a signal having the same frequency as that used in the asynchronous mobile communication system,

15 wherein the mobile communication system is operated in such a way that, as a multi-mode multi-band mobile communication terminal having an asynchronous modem unit and a synchronous modem unit passes through the handover cell area from an asynchronous mobile communication network area and then moves into a synchronous mobile communication network area, the mobile communication terminal receives a signal transmitted from the handover base station, thus performing handover.

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14. The mobile communication system according to claim 13, wherein the signal transmitted from the handover base station includes scramble codes indicating information about a cell in which the mobile communication terminal is located.

15. The mobile communication system according to claim 13, wherein the handover cell has a size of  $S_{HOCELL} = V_{MS} * T_{HO}$ , where  $S_{HOCELL}$  is the size of the handover cell,  $V_{MS}$  is a moving speed of the mobile communication terminal, and  $T_{HO}$  is a time required for the handover.